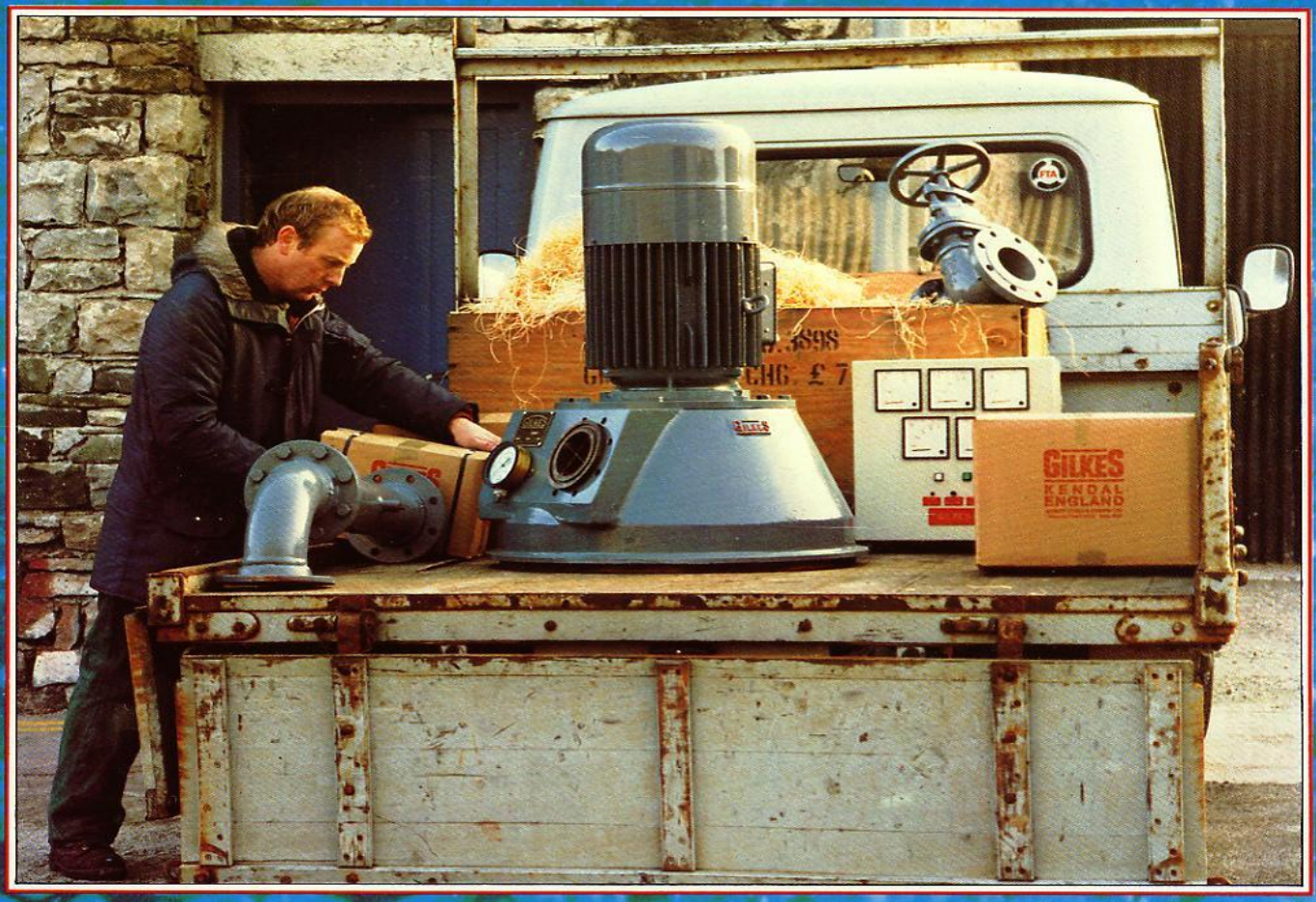
M 84

GILKES

PACKAGED HYDROELECTRIC UNIT
5kW TO 100kW



A COMPLETE POWER PACK

YOU ADD THE WATER
and a little local skill

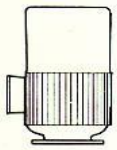
GILKES

THE GILKES HYDRO ELECTRIC PACKAGE COULD BE THE BEST BUY YOU WILL EVER MAKE.

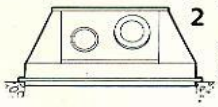
This unit will run with nil fuel costs for twenty or more years giving you a real mains quality supply for all domestic, agricultural and light industrial use.
BUT you must appreciate that hydro power demands a number of basic requirements and if you cannot provide these it is **NOT FOR YOU.**
BUY a gasoline or diesel generator set; take it home, place on the floor and you could be enjoying power in an hour, and buying fuel for life.
BUY A hydro power unit; you must have an adequate flow of water, this must be relatively near to where you require the power and available at sufficient height to provide the head of water above the site you have chosen.
Next you are going to have to make a dam, a pipe intake structure with trash grids, install a pipe of the correct bore and strength for the head, making sure that it is rigidly anchored, particularly on bends and at each end or you might find you have a large snake chasing you down the valley. However, after all this hassle you are going to enjoy power 24 hours a day with nil fuel costs.
OK – now if you've got the message this is what we will supply:–

WHAT YOU GET

This is a very simple unit comprising:–

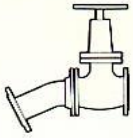


1 Vertical generator.
Sized to suit your water supply or power requirements.



2 Turbine housing on which the generator sits and which, itself, is grouted into concrete foundations.

3 A manually operated spear valve (optional) which will regulate flow to the turbine if you have varying stream flow during the year.



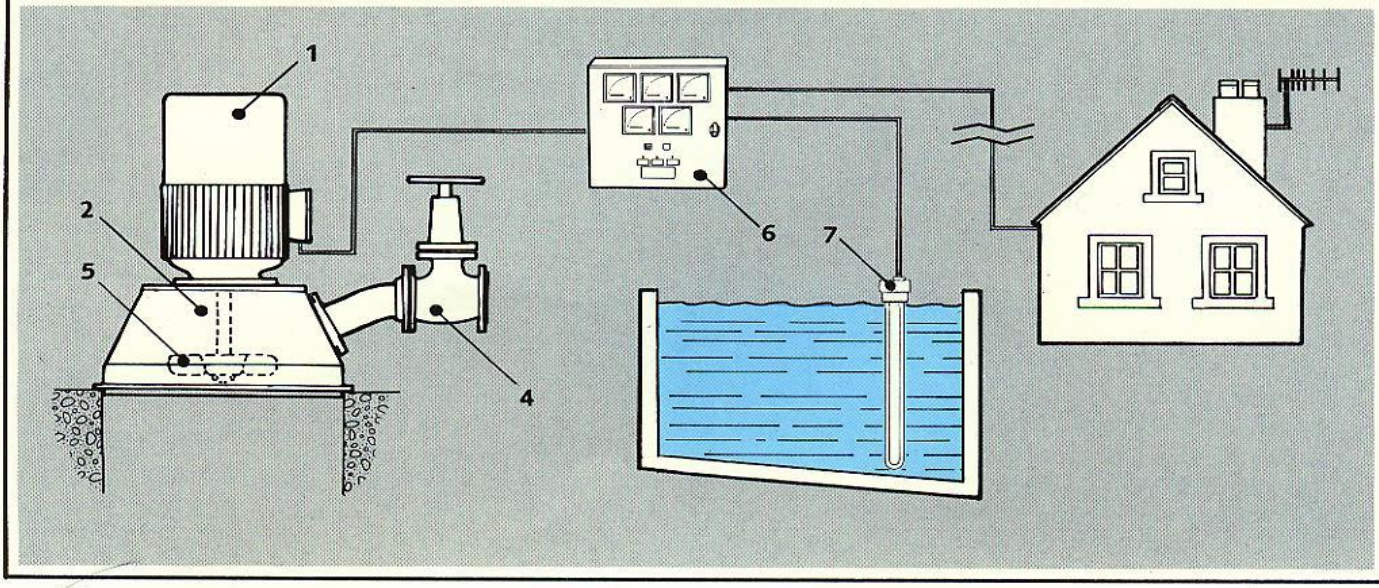
4 Inlet Pipework and isolating valve to connect to your pipeline.

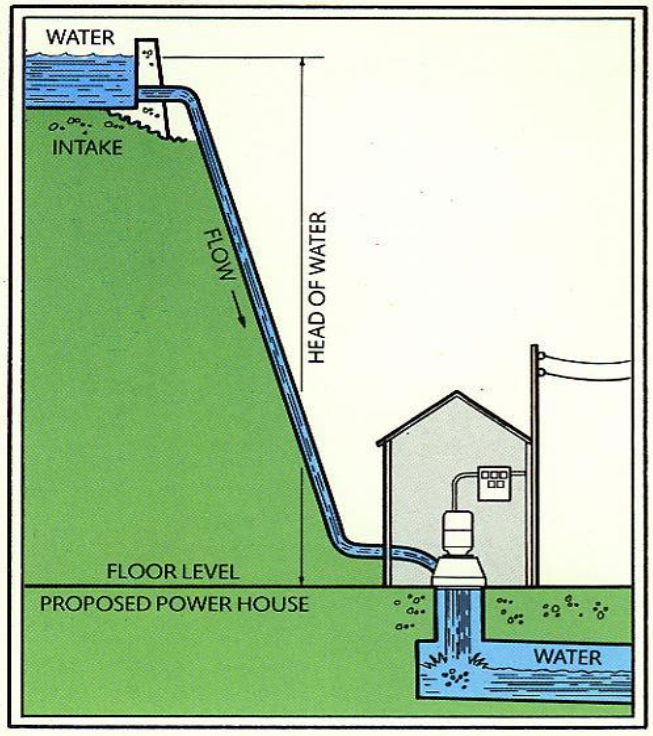
5 The turbine runner – the heart of the unit – which is mounted on the generator shaft end.

6 Control panel which includes an electronic load governing system to give you stable, reliable power.

7 Load 'dump' which is part of the governing system which can be air or water heaters. This automatically takes the excess power generated by the turbine which you are not using on your main services. (Perhaps it could heat the swimming pool overnight!)

Put all this together and you have the Gilkes Hydro Electric Package.



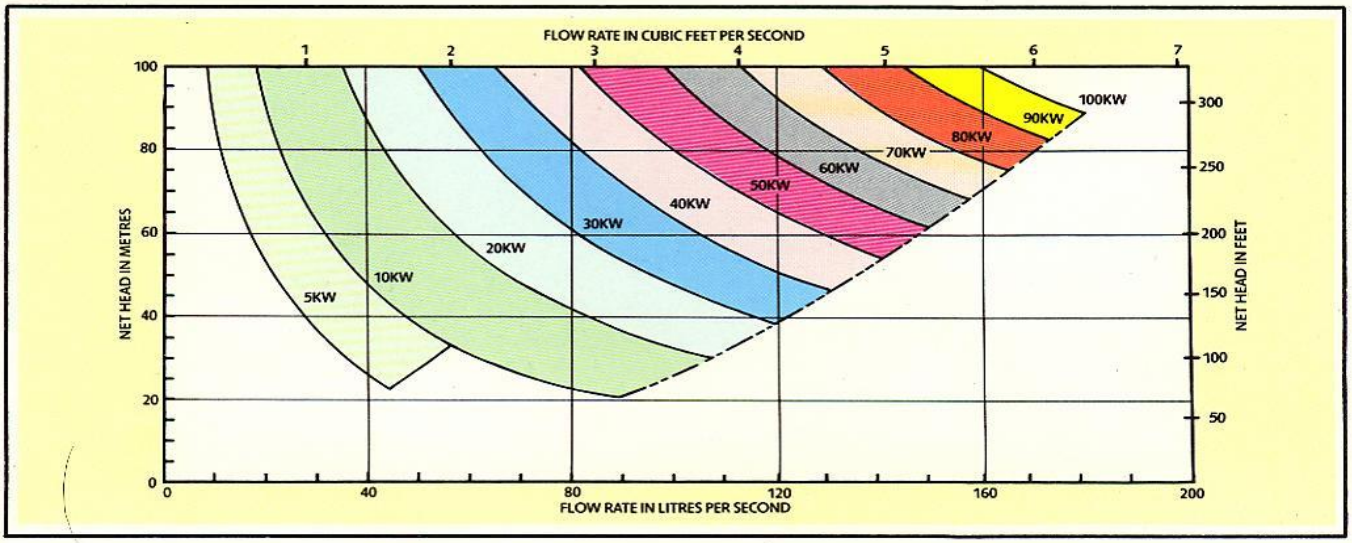


WHAT POWER CAN YOU GET FROM YOUR SITE?

Power available to you depends upon the "flow" and "head" of water you have at your site.
Flow is measured in litres per second or cubic feet per second.
Flow varies with rainfall. If you do not have an idea of flow, or a nearby river guaging station, send for our leaflet "M9" which tells you how to measure it.
Head is the vertical distance from the water level at the intake to the turbine position.

Knowing head and flow do they fall within the coloured area on this graph?

If it does, you should now know how much power you can generate.
Without knowing your available flow you can discover the flow you require from the same graph by locating the point at which your head of water gives your required power.

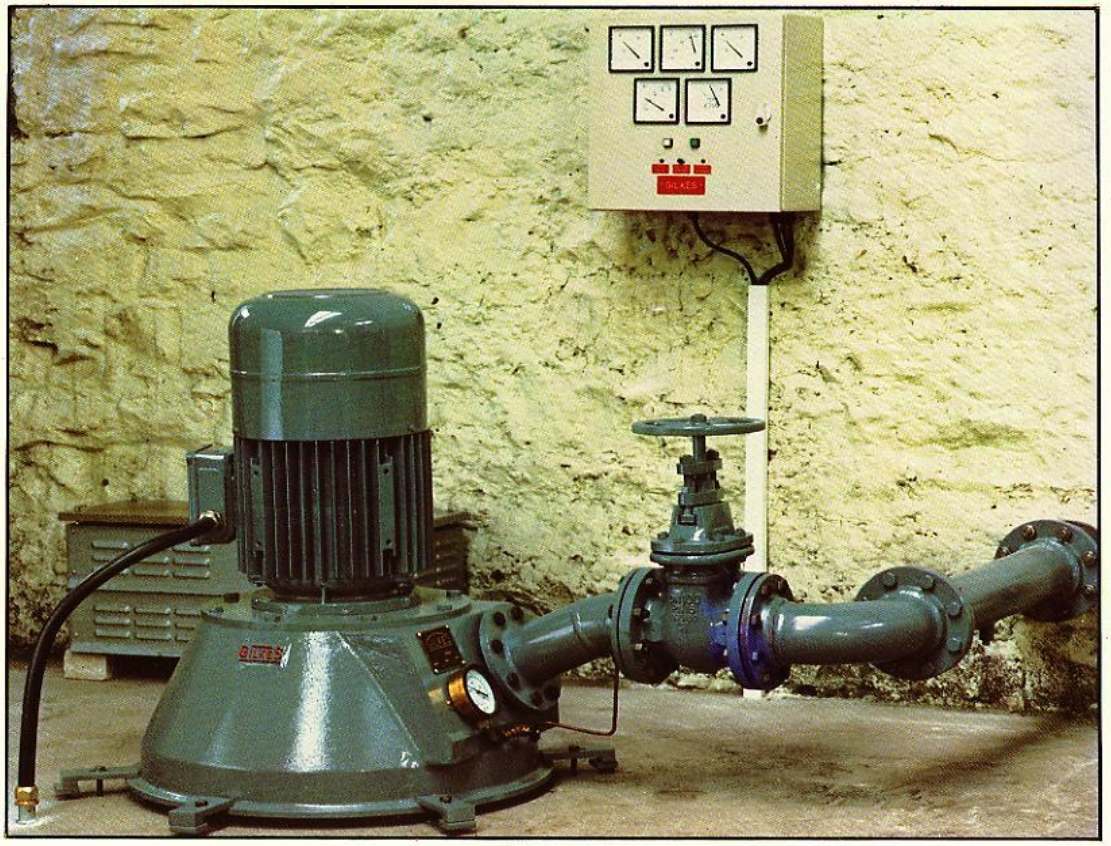


HOW MUCH POWER DO YOU NEED?

This is a chart of power used by typical household appliances.

Of course you do not use every appliance at the same time!

Freezer	350 Watts	*Refrigerator*	360 Watts
Hi-Fi	30 Watts	*T.V. (colour)*	350 Watts
Light (100 Watt)	100 Watts	*Washing Machine*	700 Watts
Light (fluorescent, 4')	50 Watts	*Water Heater*	4500 Watts
Radio	50 Watts	*Vacuum Cleaner*	750 Watts



An 11kW installation.

HOW MUCH DOES ALL THIS COST?

Call or write to Gilkes or your local dealer with your head and flow (or average power requirement) and we will supply the price immediately.

Don't forget you will also need:–

1. An intake structure.
2. A pipeline (we can advise suitable diameter and material if you tell us the length).
3. A simple power house with a concrete floor for mounting the turbine over an exit water pit.
4. A transmission line from power house to your house/farm/whatever.
5. Necessary permission to generate power from water authority, power board or federal agencies (depending on where you live).

GILKES

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Our policy is one of continuous improvement and we reserve the right to alter any details of our products at any time without giving notice.

Designed and produced by Smyth, Milligan & Taylor Ltd. Printed in U.K.

SMT 984

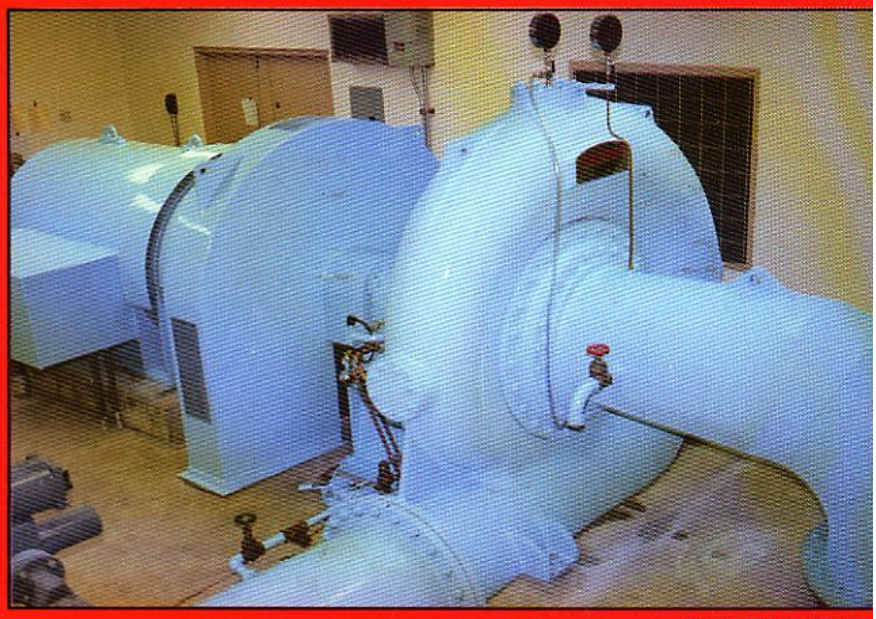
GILKES

We at Gilkes are pleased to announce our continuing success in North America.

Since "Water Power 1983", we have received orders for sixteen turbines from Alaska to Colorado.

Customers include electricity utilities, private investors, municipalities and industrial users such as mining companies and fish farms. Generated outputs range from 300 kW to 8,500 kW.

The medium/high head sites on the western side of North America are particularly well suited to our range of Francis, Turgo Impulse and Pelton water turbines.



Scotts Flat, California

GILKES IN NORTH AMERICA

Little Cottonwood Creek, Utah

GILKES

Gilkes Inc. P.O. Box 628 1902 Highway 146 Seabrook
Texas 77586, USA Tel: 713 474 76222/23 and 3016
Fax: 713 474 5304

Gilkes success is due to a number of factors:

EXPERIENCE – we have been manufacturing water turbines since 1856 and have supplied 7,000 units world-wide.

RELIABILITY – our water turbines frequently operate with minimal maintenance for 50 years – some "old stagers" have lasted for 80 to 100 years!

RANGE – We have the right turbine for a wide range of heads and outputs – 10 to 3,000 feet; 5 to 12,000 kW.

BACK-UP – sophisticated computer-aided progress and production systems ensure swift, accurate deliveries to be predicted and maintained.

– a well qualified engineering/design team makes certain that customers' requirements are built into each contract.

– our USA office in Seabrook, Texas, staffed with highly experienced engineers gives an immediate and reliable service to our North American customers.

Below is a list of Gilkes water turbines supplied to North America.

Project	No. of Units	Year	Type	Output BHP	Net Head Ft	Speed RPM
Heap & Partners Ltd., St. John's, Newfoundland	1	1924	Pelton	5.5	270	1400
Pioneer Gold Mines Ltd., Canada	1	1935	Turgo	380	240	510
Yukon Hydro, Whitehorse, Yukon	1	1954	Spiral Cased Francis	800	200	1200
City of Revelstoke, Cranberry Creek, British Columbia	1	1959	Turgo	5800	770	600
Tolt River, Seattle, Washington	1	1961	Pelton	75	700	1200
City of Revelstoke, Cranberry Creek, British Columbia	1	1963	Turgo	5800	770	600
Western Mines, Campbell River, British Columbia	1	1965	Pelton	4500	2050	900
City of Seattle, Washington	1	1969	Turgo	76	235	1200
Alaska Packers, Chignik, Aleutian Islands	1	1977	Hydec, TJ	90	230	1800
Tupperware Company, Blackstone Plant, Rhode Island, N.Y.	4	1979	Vertical Pressure Penstock Francis	600	30	200
Little Cottonwood Creek, City of Murray, Utah	2	1981	Turgo	3564	395	450
City of Preston, Idaho	1	1982	Turgo	575	576	1200
Boulder Creek Hydro, Montana	1	1983	Turgo	456	600	1800
Western Energy Associates, Tunnel Hill, California	1 1	1983 1983	Hydec, TJ Hydec, SJ	510 347	259 259	900 900
Westmin Resources, Thelwood, Vancouver Island	1	1983	Pelton	11,462	1437	600

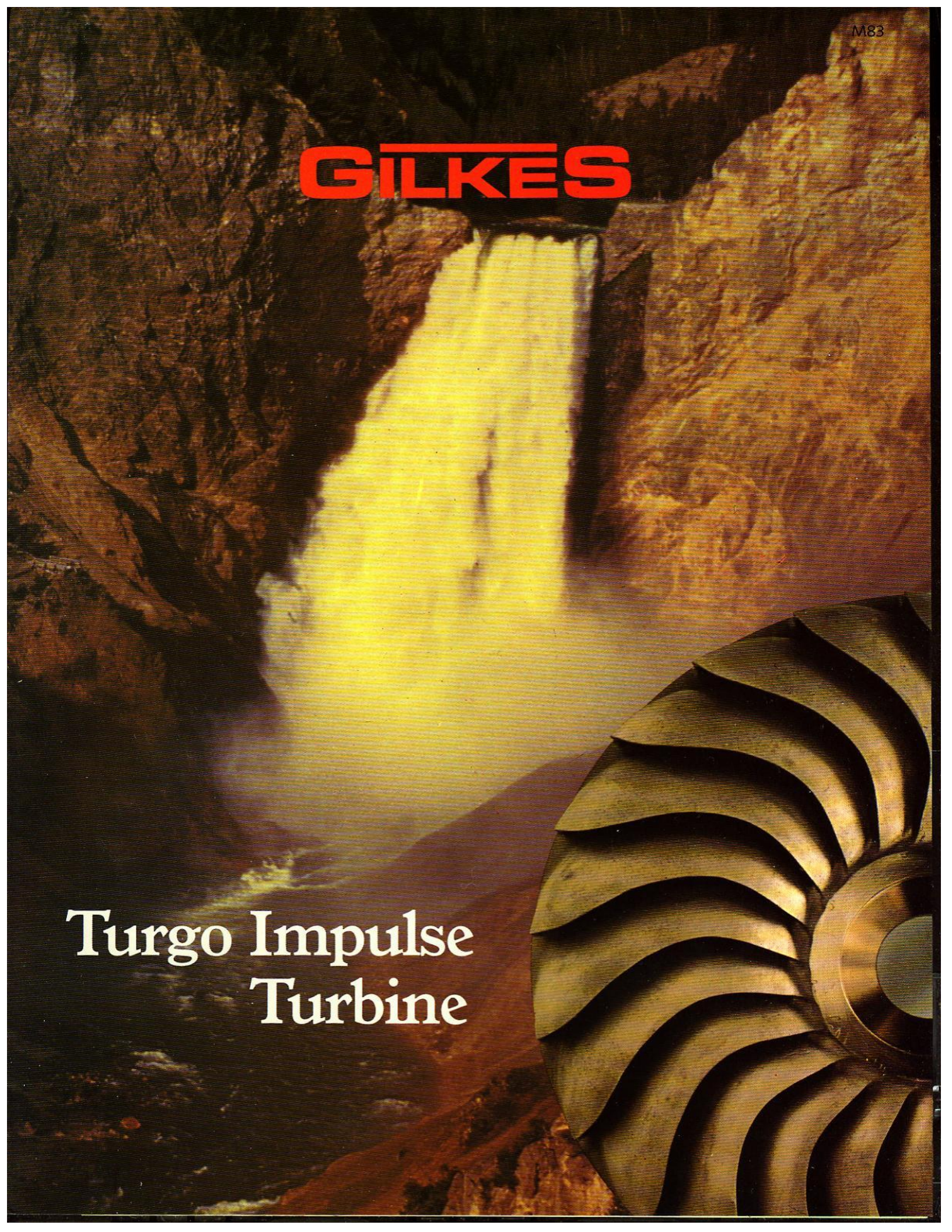
Project	No. of Units	Year	Type	Output BHP	Net Head Ft	Speed RPM
Catalyst Energy, Slate Creek, California	1	1983	Turgo	5444	558	900
Alaska Electric Light & Power, Lower Salmon	1	1983	Turgo	7932	800	720
Frontier Technology, Falls Creek, Oregon	1	1983	Pelton	5492	2044	1200
St. George, Utah, Quail Creek	1	1983	Turgo	2040	177	450
Ray Toney & Associates Scotts Flat, California	1	1983	Spiral Cased Francis	1310	160	720
City of Aspen, Colorado, Ruedi Dam	1	1984	Turgo	5431	272	360
F. Hooper, Elko, Nevada, Warm Springs	1	1984	Turgo	960	318	720
Sorenson Engineering, Warm Springs, Idaho	1	1984	Spiral Cased Francis	1454	180	720
Ray Toney & Associates, South Fork Bear Creek, California	1	1985	Turgo	4086	650	1200
*Alaska Diesel Electric Inc., Esther Hatchery, Alaska	1	1985	Spiral Cased Francis	433	86	514
*Sorenson Engineering, Littlewood River Ranch, Idaho	1 1	1985 1985	Horizontal Pressure Penstock Francis	860 400	27 27	160 240
*McKay Water Power Inc., Mega Renewables Inc., Roaring Creek, California	1	1985	Turgo	2790	291	515
*Hamilton Brothers for City of Monroe, Utah	1 1	1985 1985	Turgo Pelton	333 353	405 1290	1200 2300
*Sorenson Engineering, Georgetown Irrigation, Idaho	1	1985	Turgo	555	214	720

* Units due on line by end December 1985

We have the experience, the expertise and the best equipment for your hydro application – call us with your enquiries.

M83

GILKES



Turgo Impulse Turbine

What is a Turgo Impulse Turbine?

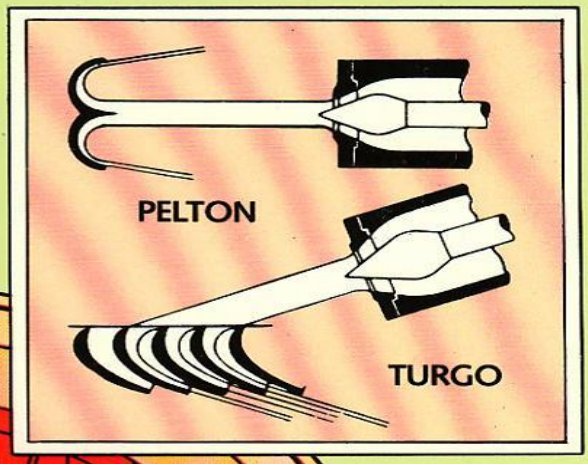
The concept behind the Turgo Impulse design was to provide a simple Impulse type machine having a considerably higher specific speed than the single Jet Pelton. The design allows a larger jet of water to be directed at an angle onto a runner of small diameter, hence an average specific speed of 15 Imperial units – 65 metric units is available.

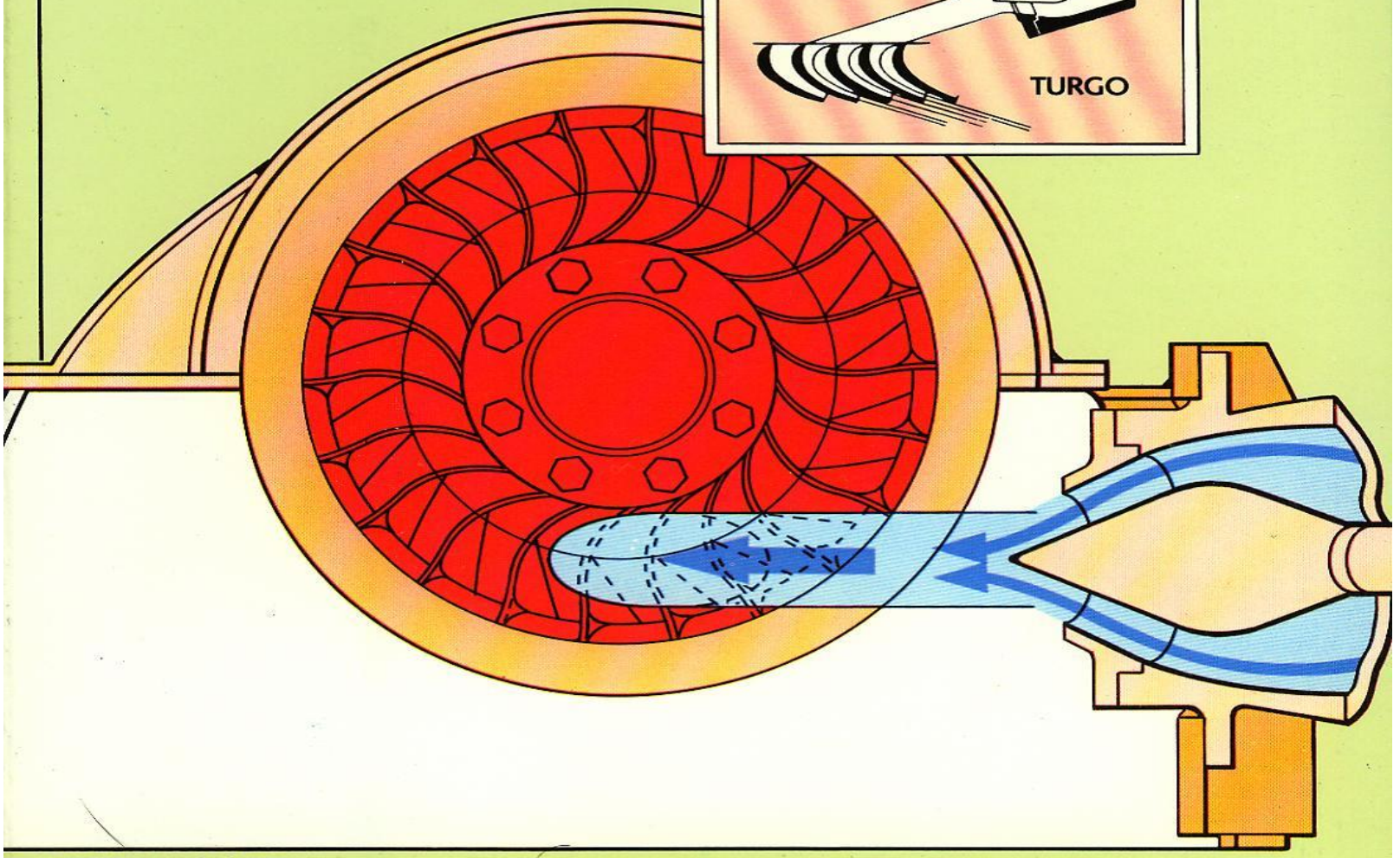
The first Gilkes Turgo Impulse Turbine was installed in Scotland in 1919. Since then, turbines of this exclusive Gilkes design have been operating in over 60 countries, many of them repeat orders and most of the 1720 units manufactured are still operating.

The fact that the machine can operate at heads from 50 feet (15M) to 1000 feet (300M) indicates the universal application, allowing installations of Impulse turbines in what was previously exclusive Francis turbine territory.

Gilkes, with their inhouse Research and Development Department and test facilities have continuously improved and uprated the original design. We have a design team exclusively engaged to ensure that we maintain this position as a market leader.

Like all equipment of outstanding performance or design, attempts have been made to copy the Gilkes Turgo Impulse turbine but only Gilkes can back the design with 60 years of manufacturing, installation and servicing experience.





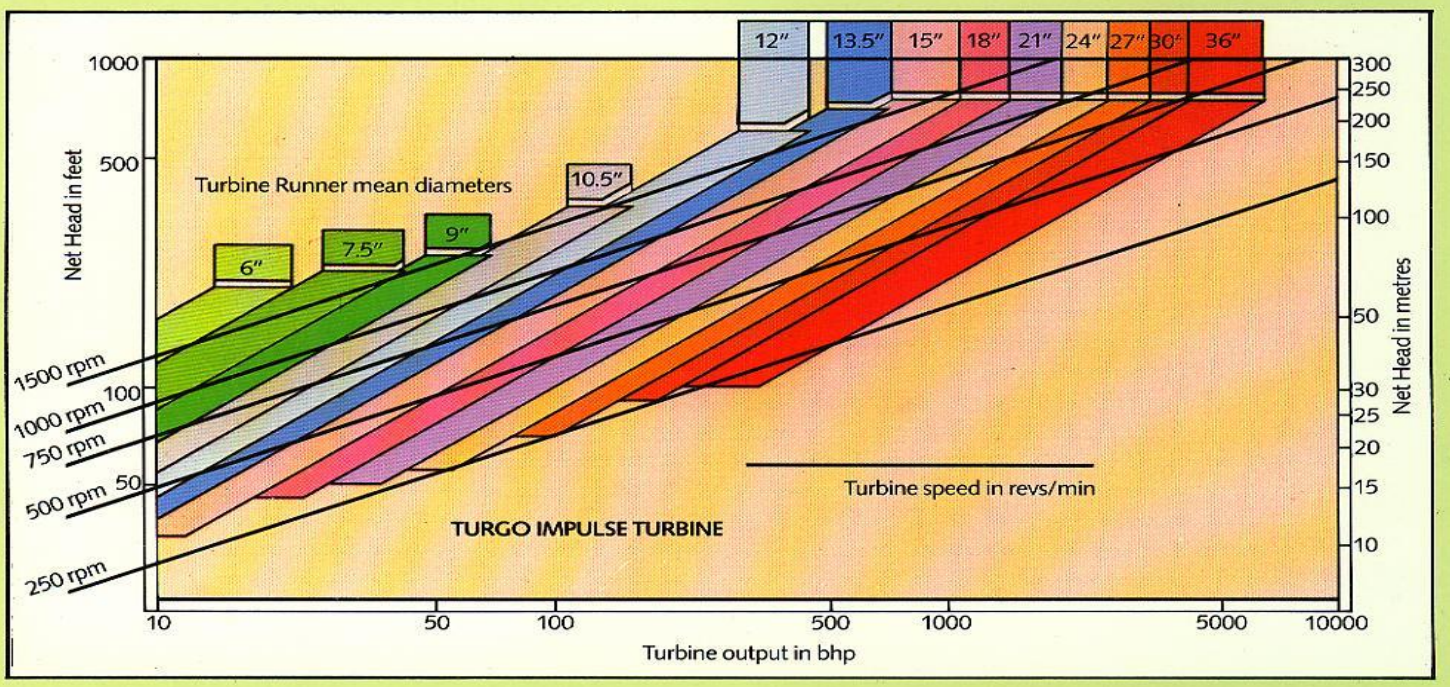
Cover photograph of Lower Yellowstone Falls by permission of US National Park Service.

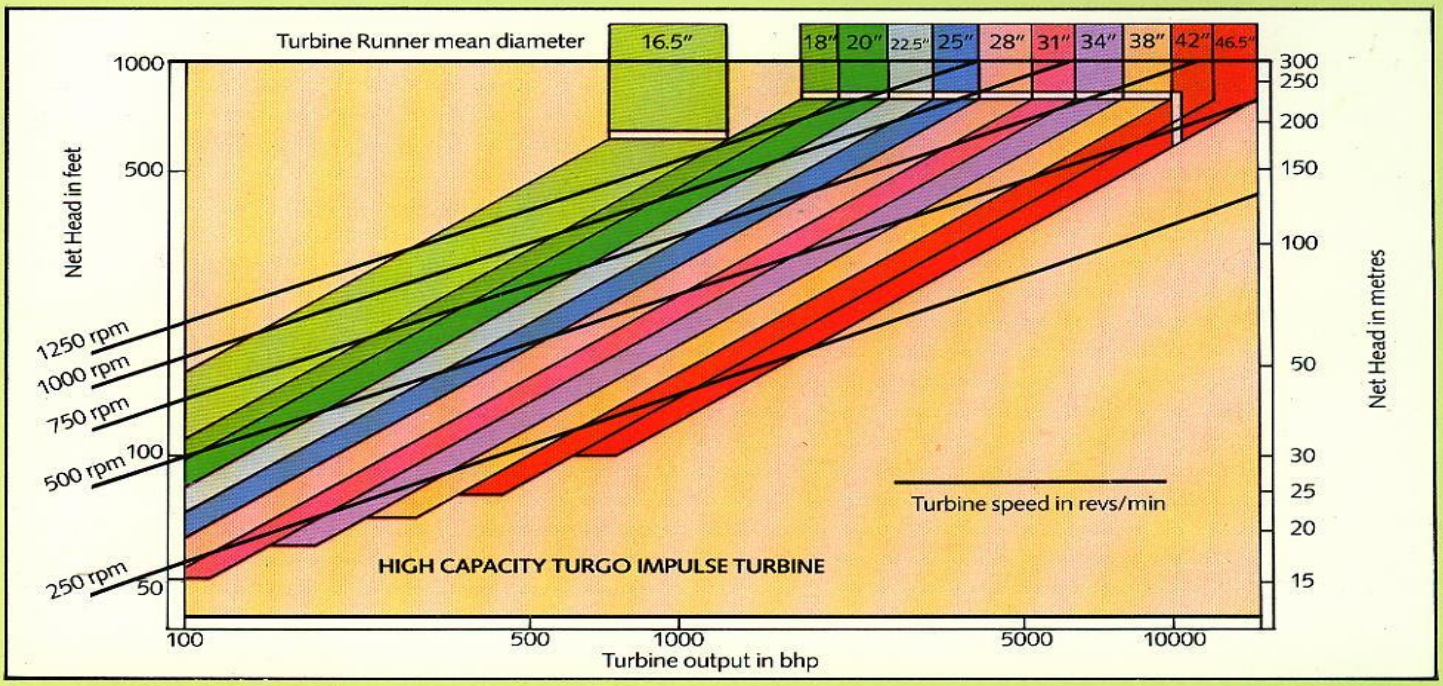
Turgo Impulse Turbine Preliminary Selection Data

The tables below are intended as a guide.

Certain high capacity models are available in twin jet versions providing up to twice the power outputs indicated below.

We will be pleased to submit details of the most suitable Turgo Impulse unit for your need against site specifications.





The Advantages of the GILKES Turgo Impulse Turbine

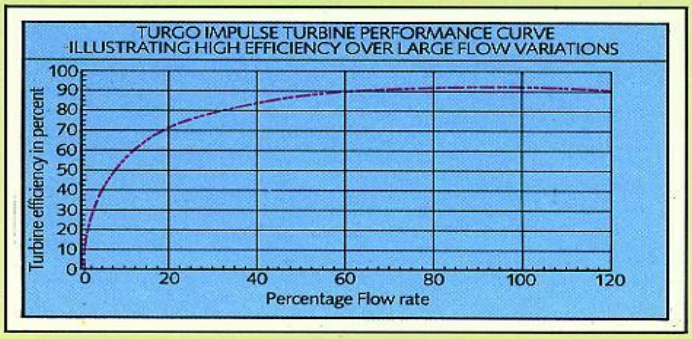
When considering a hydro-electric installation, even very competent engineers tend to overlook the considerable difference between water turbines and other types of motive power units.

The quality engineered water turbine, should be good for at least 50 years of operation, with the minimum of down time and spares requirement. In addition to this, the costs of the mechanical components (turbine – generator – governor) are generally only a very small proportion of the total hydro plant installation, when one considers the water storage facility, pipelines, powerhouse, switch gear and transmission lines. It is, therefore, vital that the correct priorities are recognised. The water turbine must be of a proven design, from a well established manufacturer:

- capable of producing its rated output
- have a high efficiency
- serviced with the minimum of downtime
- must be the right type of turbine for the prevailing head, flow rates and other site conditions.

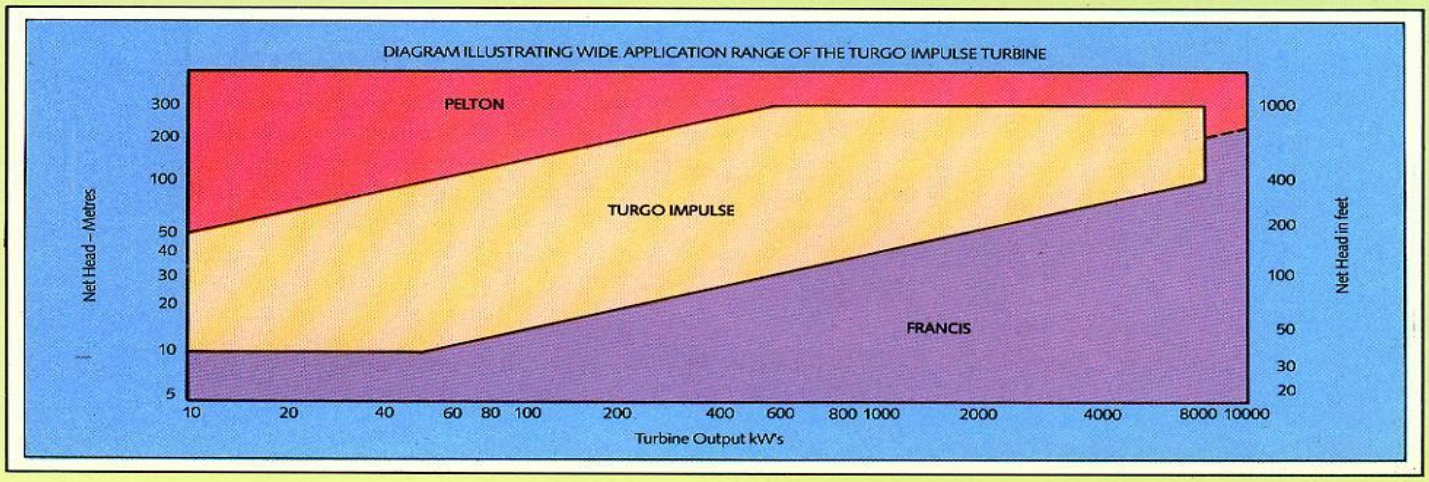
The Gilkes Turgo Impulse turbine has the following major advantages relative to other Impulse and Reaction turbines over a very wide range of head conditions.

1) Being of the Impulse pattern, no fine clearances are involved which means that the turbine can operate on silt laden water over long periods with the minimum of wear. When this does occur, wear at the spear tip and nozzle can be easily repaired and after longer periods the runner can be repaired by welding if required. Turgo Impulse turbines are very popular at mining power plants, being able to provide a long life when operating on mining tailings. The overall efficiency is unaffected by normal wear.
2) All working parts, including the governing deflector are easily accessible through the detachable top cover or through the tailrace pit. Manholes are provided for routine inspection.

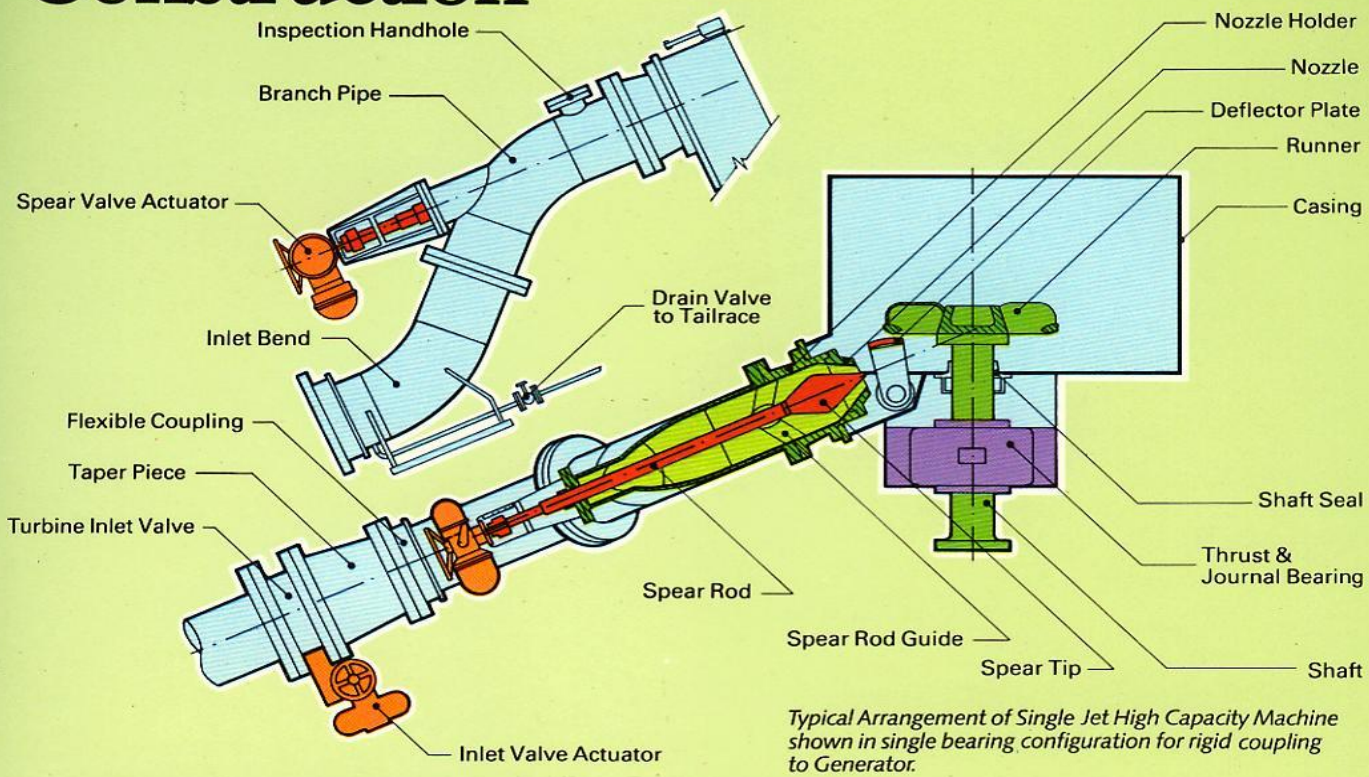


3) Speed-load control is usually carried out by jet deflector, governor operated. This method of governing ensures that there are no pipeline shock loads even on full load rejection. Where water economy is of paramount importance, the deflector governing can be augmented by follow-up closure of the spear, the rate of closure being designed to be compatible with the pipeline design rating. This gives the Turgo Impulse a very considerable advantage over medium to high head Francis turbine installations which require uprated pipelines, surge facilities or relief valves.
4) There is no danger of cavitation damage to the runner or casing.
5) The performance curve is extremely flat giving high efficiency over wide flow and load variations. This is particularly important where the turbines are used on sites subject to seasonal flow changes or in conjunction with municipal water supply or irrigation schemes. The twin jet version available in the high capacity range provides for even wider flow variations whilst maintaining high efficiencies.
6) The large jet diameter relative to runner mean effective diameter provides a machine capable of passing large quantities of water when the turbines are being used as a flow regulating device in addition to a power generation machine.
7) The high specific speed characteristic generally means that a more compact and cheaper generator can be used even when compared with multi jet Peltons.
8) These features all indicate that the Gilkes Turgo Impulse turbine must be seriously considered where one is looking for a medium to high head machine of proven efficiency, reliability and simple maintenance.

ASK US TO PUT YOU IN TOUCH WITH SATISFIED USERS.



Construction



Typical Arrangement of Single Jet High Capacity Machine shown in single bearing configuration for rigid coupling to Generator.

Although a considerable amount of design standardisation has been achieved, site conditions may dictate slight modification of detail. The following is, therefore, a general description rather than a detailed specification.

Casing

The turbine casing is manufactured in two parts and made of cast iron or fabricated steel depending on size and type.

The lower part is specially designed to allow free discharge of water from the runner and includes arrangements for secure grouting into concrete foundations. The upper part is easily removed for access to the runner and dismantling.

Runner

The runner is formed from a single casting with integrally cast buckets. Materials vary depending on operating conditions but are usually cast iron for lower heads, bronze or cast steel for medium heads and chrome-nickel stainless steel for high heads. The runner can be mounted on its own turbine shaft or overhung on the generator shaft making a compact unit.

Shaft

The turbine shaft is of carbon steel either machined from bar or forged. On larger units the design incorporates a forged thrust collar and half coupling.

Bearings

Depending on size of unit the bearings are either tilting pad, oil lubricated, thrust and journal type on high power outputs, or grease lubricated ball and roller bearings on small power outputs. Where required lubricating oil and cooling water systems are included.

Spear Valve

Branch Pipe
Is manufactured from cast iron, cast steel or fabricated steel depending on pressure ratings.

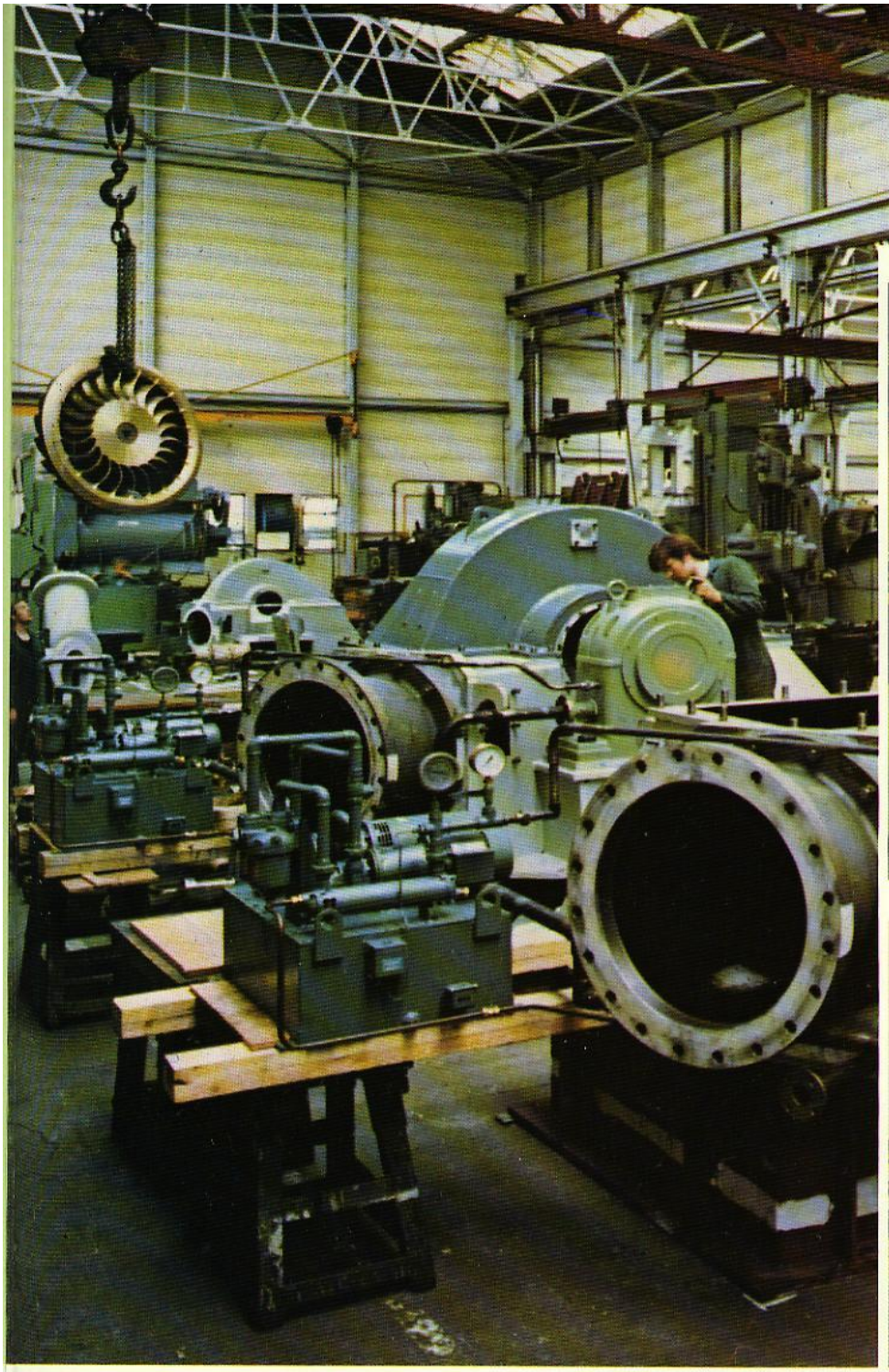
Spear Tip and Nozzle
Are manufactured from stainless steel or bronze depending on head and quality of the water, both items are easily renewable.

Spear Rod
Is manufactured from stainless steel and is supported by a bronze guide which also corrects the flow as it approaches the nozzle, ensuring a clean and efficient jet.

Operation can be electrical, manual or by oil servo.

Jet Deflector

The deflector plate is of stainless steel or bronze and can be easily replaced when worn.



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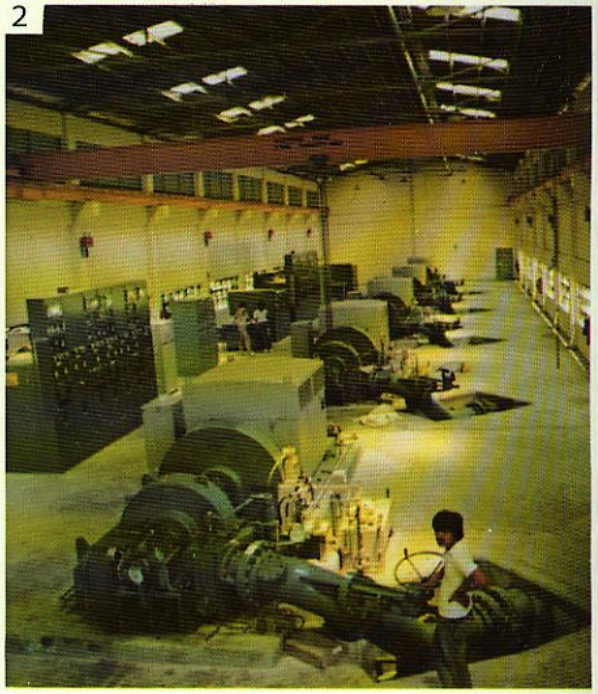

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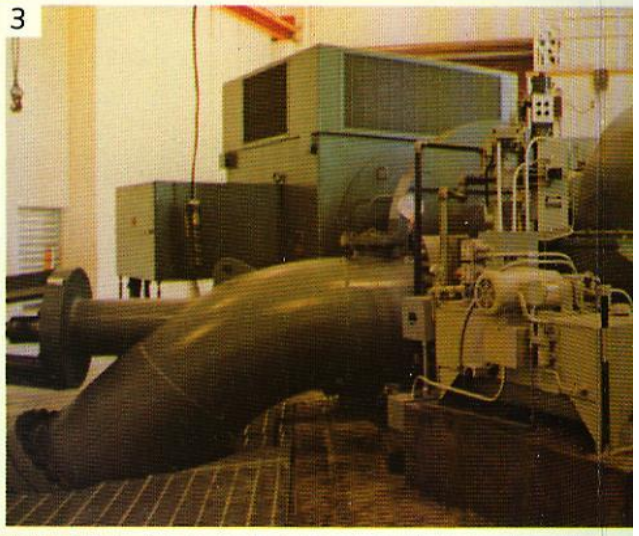

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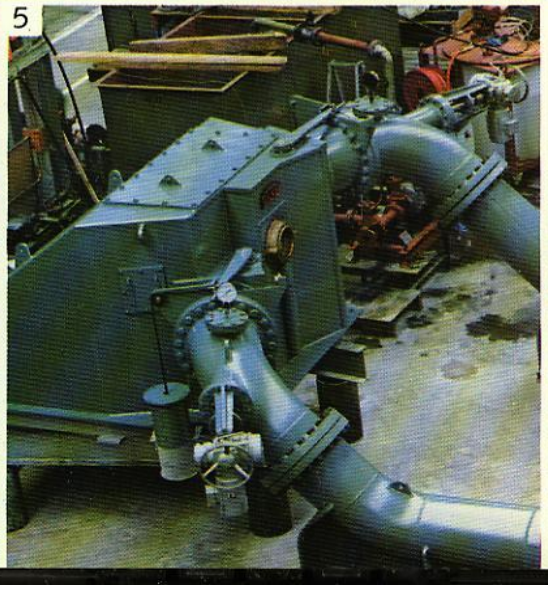

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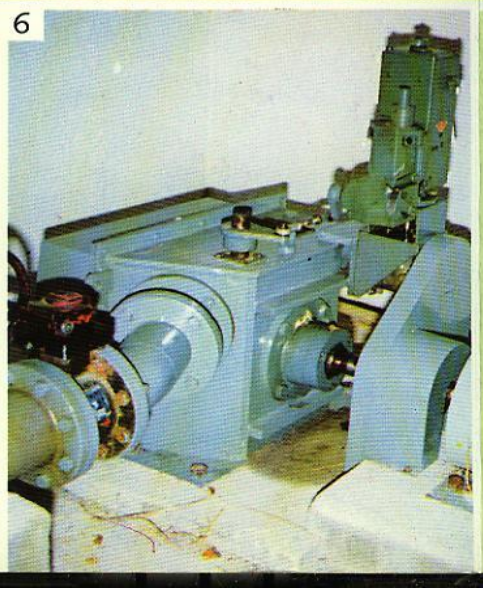
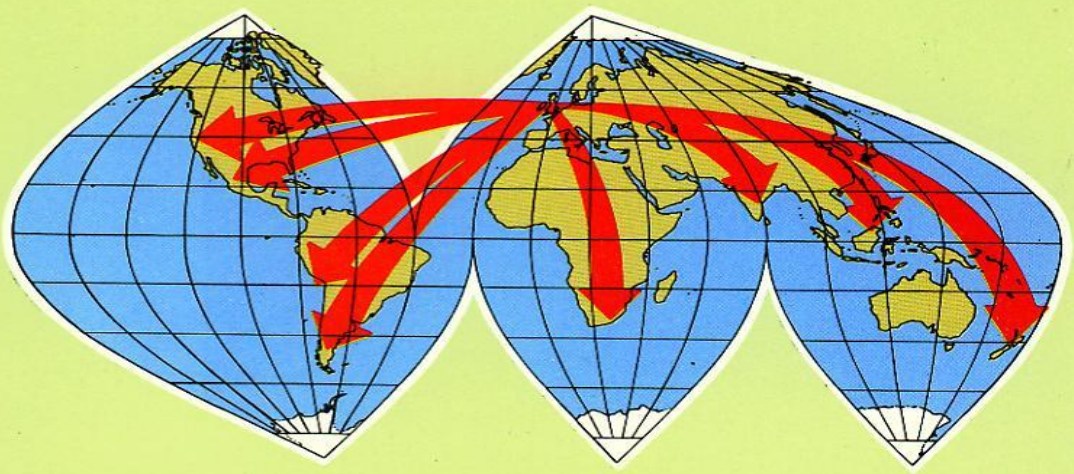


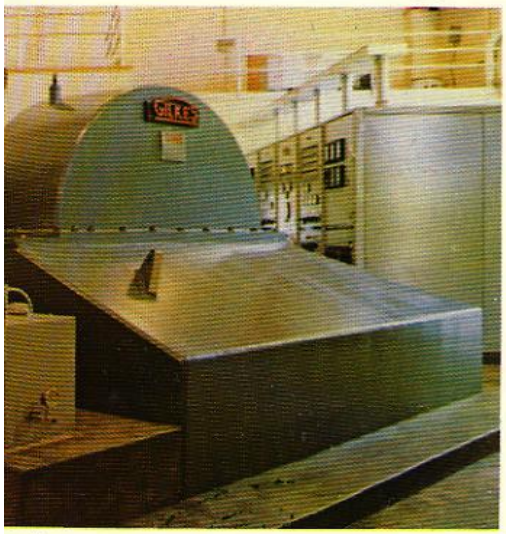
Reaching across the world



1) *Large Turgo Impulse Turbines being assembled in our factory.*

2) *Agua Grande Power Station supplying power for rural electrification in the Phillippines comprising five Turgo Impulse Turbines each developing 1000 kW on 180 metres head.*

3) *One of two High Capacity Turgo Impulse machines installed at City of Murray, Utah, U.S.A. each developing 2.7 MW on 395 ft. head.*



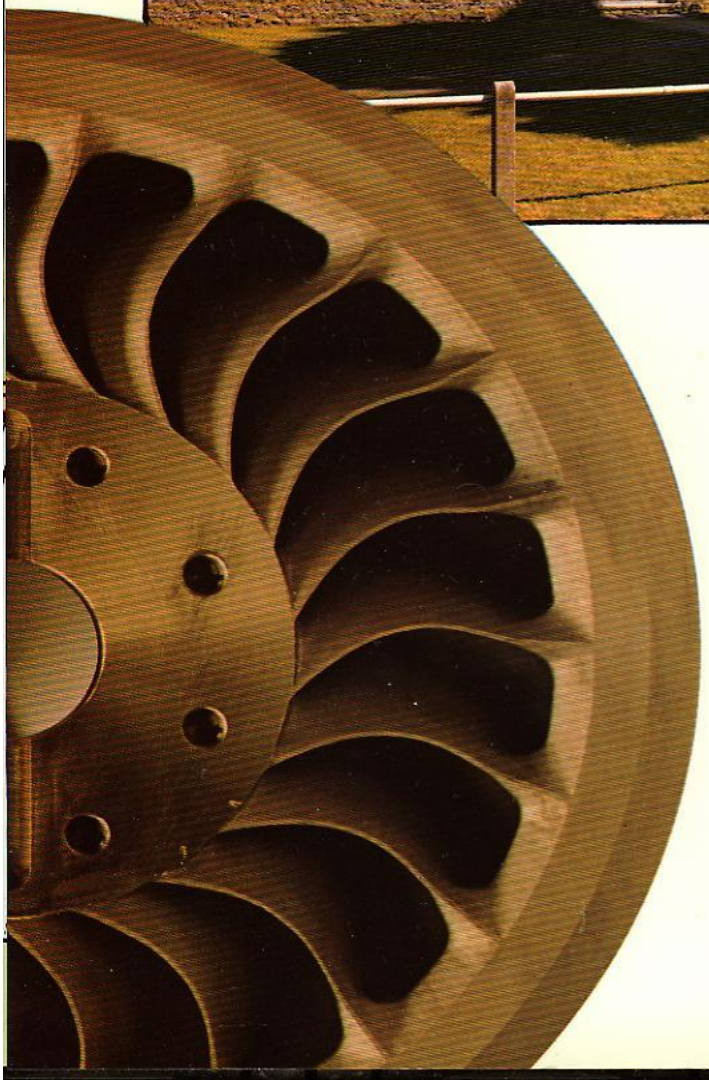
4) *One of several Turgo Impulse Turbines installed in Western Samoa developing 950 kW on 86 metres head. These machines supply power to the State Electricity Board.*

5) *Twin jet Turgo Impulse Turbine developing 2700 kW on 160 metres head being assembled in our works for Lydenburg Municipality, South Africa.*

6) *Small Turgo Impulse Turbine developing 9 kW on 100 ft. head providing power for an estate in Scotland.*

Customer	OUTPUT BHP	Head Metres
Thika Township, Kenya	5	19
Turnbull & Jones Ltd., New Zealand	18	27
Colombo Commercial Co. Ltd., Sri Lanka	21	37
Papua New Guinea Elec. Commission, Simbai Patrol Post	40	12
Uttar Predesh, India	50	27
Kaligua Tea Estate, Indonesia	168	38
G. Williamson & Co., Tanzania	300	107
No. 2 Mining Corporation, Rangoon, Burma	400	84
Blackheath, City of Cape Town, South Africa	900	60
North of Scotland Hydro Electric Board, Lochalsh Scheme	920	131
City of George Town, Ayer Itam Dam, Penang, Malaysia	1130	151
River Fossa Development Scheme, Iceland	1200	170
Government of Western Samoa, Samasoni H.E. Project	1273	90
Agua Grande, NEA, Republic of the Philippines	1284	180
Padu Hydel Scheme, Dominica	1360	141
Minera Alianza S.A. Peru	2289	163
Little Cottonwood Creek Project, City of Murray, Utah, U.S.A.	3564	120
Marmoles y Cementos de Nare S.A., Columbia	4250	90
Mauritius H.E. Co., Curepipe Power Station, Mauritius	4500	273
Inecel El Ambi, Ecuador	5600	209
City of Revelstoke, Cranberry Creek, British Columbia, Canada	5800	235
Ruselkraftwerke, Deggendorf, W. Germany	10,094	235

GILKES



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